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the general form of the tail being very similar to the Greek character γ. The southern side still remained the brightest.

Nov. 14, 17^{h} 30^{m}.—The nucleus: the two concentrations of light were smaller, more elongated, and much closer together than when last observed. It was only through the definition being exceptionally good that the division could be seen. The whole nucleus was greatly changed, being much narrower and longer than on the 8th inst.

The Orbit of the Great Comet (b) 1882. By F. C. Penrose.

I have obtained by graphical means the elements given below. They are based on

(1) A meridian observation at Washington Sept. 21.
(2) Observations at Rome and Palermo Oct. 1.
(3) Rome, Palermo, Lund, and Athens Oct. 11.
And corrected by Cambridge University Nov. 26.

	°	′	″
T	Sept. 17·223		
Long. of ☊	345	53	0
i	38	5	24
π − ☊	69	35	9
Distance	[7·90309]		

The orbit not being distinguishable from a parabola.

The places observed before perihelion do not exactly fit these elements, but would do so if the axis of the parabola be changed about 2° in its own plane. I have not succeeded in finding an orbit with an undeflected axis which would give a good account of the observations taken both before and after perihelion.

The accompanying plate shows the positions observed within about three days of the perihelion as reduced to the node and inclination given above.

It will be seen that the parabola threads its way amongst those taken after perihelion very satisfactorily.

I should add that the graphical work in itself appears to me capable of bringing out an approximation within ten minutes of arc of the finally concluded elements; and that may, I think, be taken as about the limit, unless a very large and inconvenient scale be adopted. The remaining work is done by adjusting the differences numerically.

The observations were corrected for parallax and aberration; and I found that near the perihelion even the graphical work in this orbit was affected very sensibly by these adjustments.

1882, *Jan.* 12.

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Note on William Ball's Observations of Saturn.

By Prof. J. C. Adams, M.A., F.R.S.

In No. 9 of vol. i. of the *Philosophical Transactions*, a brief account is given of an observation of *Saturn* made on Oct. 13, 1665, at 6 o'clock, by William Ball, at Mamhead, near Exeter, and it is suggested that the appearance presented by the planet may perhaps be caused by its being surrounded by *two* rings instead of *one.*

This account has recently given rise to considerable discussion; and there are some difficulties connected with it which do not appear to have been satisfactorily cleared up. In a few copies of the volume this account is illustrated by a figure, in which the external boundary of the ring, instead of being of a regular elliptical form, has two blunt notches or indentations at the extremities of the minor axis. The plate containing this figure, however, is wanting in by far the larger number of the copies.

Now, I think, it may be safely asserted that no telescope, capable of showing *Saturn's* ring at all, ever exhibited it in this extraordinary form, and therefore if the above figure faithfully represents William Ball's drawing, he was either a very inaccurate and careless observer, or he must have been provided with very inadequate instrumental means.

On the other hand, we have ample proof that he was a careful and assiduous observer, that in particular he made a long series of observations of *Saturn*, and that these were made with instruments not much inferior to those employed by Huyghens himself in similar observations.

It is well known that Huyghens's discovery of the true nature of the appendage to *Saturn*, which had so puzzled Galileo and others, was contested by Father Fabri at Rome, who wrote under the name of "Eustacius de Divinis."

Huyghens replied to Fabri's objections in a tract which appeared in 1660, entitled *Brevis Assertio Systematis Saturnii sui*, and which is contained in the third volume of his collected works.

In this tract he repeatedly appeals to Ball's observations in England in confirmation of his own. It is clear that Huyghens was in possession of drawings by Ball which represented the various appearances presented by the planet during the four years from 1656 to 1659 inclusive, and that he had carefully compared them with those which he had himself taken during the same interval. After mentioning the dark band which he had observed on the disk of *Saturn* at times when the remainder of the ring was invisible, he quotes a letter from Dr. Wallis, dated Dec. 22, 1658, in which reference is made to an earlier letter dated May 29, 1656, wherein Dr. Wallis had mentioned this band as having been observed by Ball, and had inquired whether his correspondent had likewise perceived it. Huyghens goes on to say that from Feb. 5, 1656, to July 2, when the planet appeared round

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